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Photodynamic effect of fotoditazin on the DNA and the nuclei of erythrocytes of Brachydanio rerio

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Abstract

© 2017, Pharmainfo Publications. All rights reserved. The study is aimed at identifying the morphological and cytogenetic changes in erythrocytes of Brachydanio rerio, arising under the influence of photodynamic effects that models laser modification of blood, with the use of Fotoditazin, a photosensitizer of the chlorine range, and red laser radiation. (Methods of Research) For 15 days, juvenile fish Brachydanio rerio were kept in settled tap water after providing model of laser modification of the blood using Fotoditazin and exposure to laser radiation with the wavelength of 630 nm. The impact on the structure of DNA in the nuclei of red blood cells of Fotoditazin, laser radiation and combined effects of these factors on the changes in the fluorescence spectra of DNA and the color of fluorescence were studied. (Generalization of results and their meaning). It had been shown that separate effects of laser or Fotoditazin did not cause changes in the fluorescence of nuclei of erythrocytes, when the preparations were studied with the use of fluorescent microscopy after staining with acridine orange. After the fish were exposed for 5 minutes to the Fotoditazin solution with the concentration of 3.0 mg/l, and irradiated with red laser for 3 minutes with the power of 50 j/cm 2 , the fluorescence of the nuclei of red blood cells dimed, which might have indicated the emergence of ruptures in the DNA molecules. After 24 hours, appearance of blood cells with the core fluorescing in orange color was noted, indicating appearance of single-chain DNA's. After 48 hours, intensity of fluorescence of red blood cells' nuclei approached the reference, but nuclei polymorphism was noted, which maintained until the end of the experiment. The impact of singlet oxygen in the process of model laser modification of the blood of fish with Fotoditazin affected the emergence of cytopathological violations in erythrocytes, the percentage of which increased veraciously, as compared to the reference in case of individual use of either laser or Fotoditazin. During laser modification of blood with photosensitizers in humans, it is recommended to pay attention to the possibility of DNA structure disrupting and appearance of cytopathological disorders in cellular blood elements, which requires further study.

Keywords

Acridine orange, Changes in the DNA structure, Fish erythrocytes' nuclei, Fotoditazin, Laser radiation, Nuclei fluorescence, Nuclei polymorphism

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